INFLUENCE OF THE WORKPLACE ENVIRONMENT AND LIFESTYLE ON HEALTH OF MODERN MEN AGED 36 – 45 WHO USE COMPUTERS FOR WORK

VPLYV PRACOVNÉHO PROSTREDIA A ŽIVOTNÉHO ŠTÝLU NA ZDRAVIE MODERNÝCH MUŽOV VO VEKU 36 – 45 ROKOV, KTORÍ PRI PRÁCI VYUŽÍVAJÚ POČÍTAČE

ALOSHYNA Alla[1], ROMANIUK Valentyna[2], DEMIANCHUK Olena[1], IVANITSKIY Roman[1], PETROVYCH Viktoria[1], RYDZEL Yurii[3], GRYGUS Igor[4], CHERNIAKOV Volodymyr[3]

[1] *Lesya Ukrainka Volyn National University, Lutsk, Ukraine*
[2] *Akademiya Rekreatsiynykh Tekhnolohiy i Prava, Lutsk, Ukraine*
[3] *Chernihiv Polytechnic National University, Chernihiv, Ukraine*
[4] *National University of Water and Environmental Engineering, Rivne, Ukraine*

ABSTRACT

Background: The number of people using computers for work activities is constantly increasing. Such activities pose risks to their health that are typical of office employees.

The purpose of the article is to determine the impact of the workplace environment and lifestyle on health of modern men aged 36-45 who use computers for work.

Materials and methods: The study involved 71 men who use computers at work. The average age of the respondents was 39 years. The average experience with computers was 15 years.

Results: During the analysis of the sample of men who use computers for work, respondents were divided into two clusters. Cluster 1 comprised 56.3% of the respondents and was labeled "Men with a reduced risk of health disorders who use computers for work" based on the results. The remaining 43.7% fell into Cluster 2, labeled "Men with an increased risk of health problems who use computers for work". Compared to Cluster 2, members of Cluster 1 are more proactive about maintaining their health. They take regular breaks during PC work, visit the gym, engage in healthy recreational physical activities (HRPA), and more frequently avoid using the PC during their leisure time. Additionally, they focus more on optimizing their work environment: their workdays are limited to 6 hours, they position the monitor 50 – 70 cm away at eye level, and they take active breaks throughout the day. In contrast, men in Cluster 2 report more frequent issues such as musculoskeletal pain, headaches, and disturbances in both their visual and musculoskeletal systems.

Conclusions: The analysis obtained preliminary data on the impact of the workplace environment and lifestyle on the health of modern men aged 36 – 45 who use computers at work. We suggest that the scientific community should focus on developing interventions to overcome the trend toward a lack of health-preserving measures while using computers for work which exacerbates the negative effects of the work environment on men who use computers for work. However, for final conclusions, there is a need for further scientific research in this direction.

Key words: Men. Computer. Personal computer user. Health. Risk. Disorders. Spine. Joints. Musculoskeletal pain.

ABSTRAKT

Východiská: Neustále sa zvyšuje počet ľudí používajúcich počítač k pracovným činnostiam. Tieto aktivity nesú zdravotné riziká, ktoré sú bežné pre administratívnych pracovníkov.

Cieľom štúdie bolo zistiť vplyv pracovného prostredia a životného štýlu na zdravie moderných mužov vo veku 36 – 45 rokov, ktorí pri práci používajú počítače.

Materiály a metódy: Štúdie sa zúčastnilo 71 mužov, ktorí pri práci využívajú počítače. Vek respondentov sa pohyboval bol v priemere 39 rokov. Skúsenosti s prácou na počítačoch boli priemerne 15 rokov.

Výsledky: Pri analýze vzorky mužov, ktorí pri práci využívajú počítače, boli respondenti rozdelení do dvoch klastrov. Klaster 1 zahŕňal 56,3 % respondentov a na základe výsledkov bol označený ako „Muži so zníženým rizikom zdravotných problémov, ktorí pri práci používajú počítače“. Zvyšných 43,7 % spadalo do klastra 2 s označením „Muži so zvýšeným rizikom zdravotných problémov, ktorí na prácu používajú počítače“. V porovnaní s klastrom 2 sú členovia klastra 1 proaktívnejší pri udržiavaní svojho zdravia. Počas práce s počítačom si robia pravidelné prestávky, navštevujú posilňovňu, venujú sa zdravým rekreačným pohybovým aktivitám (HRPA) a častejšie sa vyhýbajú používaniu počítača vo voľnom čase. Okrem toho sa viac zameriavajú na optimalizáciu svojho pracovného prostredia: ich pracovné dni sú obmedzené na 6 hodín, monitor majú umiestnený vo vzdialenosti 50 – 70 cm vo výške očí a počas dňa si robia aktívne prestávky. Na rozdiel od toho muži v klastri 2 uvádzajú častejšie problémy, ako sú muskuloskeletálna bolesť, bolesti hlavy a poruchy zrakového aj muskuloskeletálneho systému.

Záver: Analýzou boli získané preliminárne údaje o vplyve prostredia na pracovisku a životného štýlu na zdravie moderných mužov vo veku 36 – 45 rokov, ktorí pri práci využívajú počítače. Navrhujeme, aby sa vedecká komunita zamerala na rozvoj intervencií na prekonanie trendu nedostatku opatrení na ochranu zdravia pri práci s počítačom, ktorý zhoršuje negatívne účinky pracovného prostredia na mužov, ktorí používajú počítače na prácu. Pre konečné závery je však potrebný ďalší vedecký výskum v tomto smere.

Kľúčové slová: Muži. Počítač. Používateľ osobného počítača. Zdravie. Riziko. Poruchy. Chrbtica. Kĺby. Muskuloskeletálna bolesť.

INTRODUCTION

Health is the most relevant phenomenon of life prospects and life quality. The trends of social and economic progress common at the current stage of the development of society, position health as a

manifestation and result of ensuring the quality of life (Aloshina et. al., 2022c). The place of health in the structure of human values is determined by its importance as the fundamental basis for the proper realization of the abilities and capabilities of each person (Aloshyna et. al., 2022a; Diachenko-Bohun et. al., 2020; Kashuba et. al., 2023).

The pandemic of COVID-19, crisis phenomena in society became a significant reason for the decrease in the motor activity of the population, the slowdown in their physical and mental development, and the decrease in their level of health (Aloshyna et. al., 2022b; Kashuba et. al., 2020a; Rudenko, 2021).

It should be noted that a sedentary lifestyle is an actual problem throughout the world. In particular, people in developed countries spend an average of 8.3 hours a day sitting on the way to work, in the office or at home (Kett et. al., 2021). Data from scientific sources indicate that prolonged sitting can cause increased muscle stiffness and fatigue (Hakman et. al., 2020; Kett et. al., 2021), discomfort (Kripa et. al., 2021) and, in the worst case, lower back pain (Byshevets et. al., 2022). In this regard, the question of whether the negative consequences of prolonged sitting can be associated with a low level of postural activity (Labinska et. al., 2021) and a violation of the ergonomically optimal posture of a personal computer (PC) user is widely discussed (Waongenngarm et. al., 2020).

In the structure of the employment of the population of Ukraine, the share of people who use computers for work is increasing. Therefore, scientists began to actively investigate risk factors for health disorders that occur in office employees under the influence of the workplace environment (Lazko et. al., 2021a). It is worth noting that, if in the past the contingent of office employees was mainly women, now there is an unprecedented increase in men who use computers for work. These are men involved in the field of IT, scientific and pedagogical workers. However, the impact of systematic usage of computers on the health of men remains understudied which prompted us to study it.

AIM

To determine the influence of the workplace environment and lifestyle on health of modern men aged 36 – 45 who use computers for work.

MATERIALS AND METHODS

Sample population: 71 men who use computers for work took part in the study. The age of the respondents varied from 36 to 45 years and was 39 (36; 42) years old on average. In terms of marital status, married men with children predominated among the respondents: their share was 60 %. 24.3 % were single, and the remaining 15.7 % were married. The experience of working on computers was about 15 (10; 17) years.

Since the purpose of the study was to study men who use computers for work, the sample we received through social networks and messengers may be more representative. These platforms really attract active Internet users, including those who use computers for work. Thus, it can be argued that the sample represents a group of men of interest to us.

Procedure / Test protocol / Skill test trial / Measure / Instruments. Based on previous studies that examine health risk factors associated with prolonged PC use (Lazko et al., 2021b; Byshyvets et al., 2022), we developed a questionnaire to assess the impact of work organization and lifestyle on the health of modern men aged 36 – 45 who use computers for work. The questionnaire contained 49 questions divided into five groups. The first group (3 questions) – acquaintance with the contingent; the second – theoretical knowledge and motivation to maintain health while working at a PC (2 questions); the third – determination of specific features of the performance of professional duties by men (17 questions); the fourth – their lifestyle (9 questions); the fifth – health disorders related to working at a PC (17 questions). A list of alternative answers or evaluations was offered for each question. Thus, data were obtained for 35 categorical and 13 quantitative indicators.

When analyzing categorical data, depending on their number of alternative answers, degrees of freedom df were calculated using the formula df = n-1, where n is the number of alternative answers.

The analyzed quantitative indicators included age, computer work experience, pain levels in the spine and joints after prolonged use, and the biogeometric profile of the user's working posture. The level of pain in the spine and joints was assessed according to the generally accepted visual-analog scale (VAS methodology), which is widely used in research in the field of physical education and sports (Tomilina et. al., 2018). During the application of

the technique, the men were explained that the typical pain level is the usual level of pain during the last 24 hours, not including acute episodes or peaks of pain. It was emphasized that they should not focus on the worst or weakest pain but indicate the average pain. Attention was drawn to the fact that in the presence of pain in the spine, the typical level of pain can vary from 3 out of 10 points.

Assessment of indicators of the state of the biogeometric profile of the working posture of the PC user was carried out using the express method (Byshevets, 2017).

Cronbach's alpha coefficient for continuous variables was 0.74 (standardized alpha – 0.84) which indicates the internal reliability of the developed questionnaire. The spline reliability (Split half reliability) of the questionnaire when split is 0.83 proves that the questions of the questionnaire are aimed at determining the studied characteristics of men.

Data collection and analysis / Statistical analysis

The analysis was carried out using the STATISTICA program (StatSoft, USA). The level of statistical significance is $\alpha = 0.05$ ($p < 0.05$). The averages of quantitative indicators that did not correspond to the normal distribution law (Kashuba et. al., 2020b) are presented in the form of the median Me and 25 and 75 percentiles: Me (25 %; 75 %).

The division of men into clusters was performed using generalized clustering in the STATISTICA Data Mining module using the EM method using V-fold cross-validation (Byshevets et. al., 2022; Lazko et. al., 2022).

There are different approaches to justifying the sample size for clustering. In our study, a sample of 71 men aged 36 – 45 who use computers for work was divided into two clusters. Generalized clustering is a powerful method that can be used to cluster data with different characteristics. The EM (Expectation-Maximization) method is a popular generalized clustering algorithm known for its efficiency and stability. The advantages of this clustering method include the ability to process input data without prior coding of categorical variables, a fuzzy approach to subgroup division, which is crucial for analyzing populations with similar characteristics, and the program's automatic determination of the optimal number of clusters. The use of V-fold cross-validation allows obtaining stable clusters that do not depend on the random partition of the data. All participants are men aged 36 – 45 who use computers for work. This makes the sample fairly homogeneous in terms of age, gender and occupation which is important for successful clustering. The detection of two clusters that differ in the duration of PC work and the level of pain in the spine indicates that the clustering was informative and made it possible to reveal the relationship between the studied variables. At the same time, the resulting clusters contained 41 and 30 observations which correspond to the recommendations for the number of expected objects in a cluster from 20 to 30 per subgroup (Dalmaijer et. al., 2022). However, according to the most up-to-date data (Demissie et. al., 2024), the prevalence of work-related musculoskeletal disorders $\hat{p}$ reaches 95.3 %. Then the minimum sample size required to ensure 5 % precision Δ for a 95 % confidence level is approximately 69 observations, which was calculated as follows:

$$n = \frac{(z_{\alpha/2})^2 \hat{p}(1-\hat{p})}{\Delta^2} = \frac{(1{,}96)^2 0{,}953(1-0{,}047)}{(0{,}05)^2} \approx 69 \quad (1),$$

where $z_{\alpha/2}$ for the 95% confidence level is 1.96.

The degree of differences between the pain sensations of men who use computers for work assigned to different clusters was assessed using the Mann-Whitney U-test with an additional evaluation of the Z-statistic (Byshevets et. al, 2021).

Pearson's χ^2 consistency test was used to compare the frequency of cases when men assigned to different clusters have this or that feature. If the conditions for its implementation were not met (in one of the constructed conjugation tables, one of the cells took a value less than 5), then Fisher's exact test was used (Byshevets et. al, 2019).

RESULTS

In the course of the study, with the aim of further developing appropriate recommendations for preserving and strengthening the health of men who use computers for work, we determined peculiarities of the work organization, lifestyle, health status and attitude to their own health.

It turned out that on average the respondents spend 6.5 (5.5; 7.5) hours a day on the computer. At the same time, if 47.9 % work on the computer from 9 a.m. to 6 p.m., then 43.7 % of respondents are characterized by irregular working hours. And the rest of them work after 18 hours. Moreover, more than a third of men, whose share was 33.8 %, in

Table 1 Assessment of differences between categorical indicators of men who use computers for work assigned to different clusters

№	Indexes	df	χ^2	p-level	p-level grading
1	Marital status	2	0,423	0,8094	-
2	Professional activity	3	4,319	0,2290	-
3	Duration of work at a PC, hours.	3	14,252	0,0026	+
4	Period of professional activity	3	3,261	0,3532	-
5	Using a PC during leisure time	2	6,124	0,0468	+
6	Duration of PC use for entertainment hours.	3	6,838	0,0773	-
7	Having a lunch break	2	6,444	0,0399	+
8	Theoretical knowledge	2	2,847	0,2409	-
9	Control of the working posture of the PC user	2	1,731	0,4208	-
10	Active breaks	2	8,352	0,0154	+
11	Self-massage	2	2,744	0,2536	-
12	Used measures	38	38,865	0,4306	-
13	Limiting factors	14	13,720	0,4708	-
14	Health-recreational physical activity	2	7,656	0,0217	+
15	Priority kinds of health-recreational physical activity	4	12,941	0,0116	+
16	Visiting a gym	2	10,952	0,0042	+
17	Frequency of visiting a gym	3	10,075	0,0179	+
18	A way of getting to the workplace	3	9,336	0,0251	+
19	Time taken to get to the workplace, hours	2	8,677	0,0131	+
20	Lifestyle	3	8,129	0,0434	+
21	Desire to expand knowledge	3	10,109	0,0177	+
22	Excess body weight	3	3,414	0,3321	-
23	Pressure	2	3,632	0,1627	-
24	Headache	2	15,071	0,0005	+
25	Visual impairment	2	10,557	0,0051	+
26	Condition of the spine	2	13,709	0,0011	+
27	Visiting a doctor regarding disorders of the musculoskeletal system	2	12,919	0,0016	+
28	Concentration of pain sensations	5	23,767	0,0002	+
29	Discomfort in the spine	6	28,062	0,0001	+
30	Condition of the musculoskeletal system	3	9,200	0,0268	+
31	Working with a computer mouse	2	6,018	0,0493	+
32	Working with the right hand	1	1,410	0,2351	-
33	Placement of upper limbs	2	2,348	0,3091	-
34	Placement of lower limbs	3	7,529	0,0568	-
35	Location of the monitor in relation to the eyes	2	20,692	0,0001	+

Legend: df – degrees of freedom, where the value of df is calculated as the number of alternative answers, reduced by one; χ^2 – Pearson's frequency test; p-level is the achieved level of significance

addition to professional duties, often use computer entertainment during their leisure time, and 56.3 % of them sometimes use a PC for the purpose of recreation, and men spend 1.5 (1.5; 2.5) hours a day on this type of leisure. And only 9.9 % do not use a PC for entertainment and communication. Apparently, men who use computers for work spend at least 8 hours a day in a sitting position.

During the division of the sample of men into clusters, we saw that the respondents were divided into 2 clusters. 40 (total 56.3 %) men fell into Cluster 1, the remaining 43.7 % fell into Cluster 2. Statistically significant ($p < 0.05$) differences were found between representatives of different clusters for 21 of 35 categorical variables (Table 1).

Frequency analysis revealed that in contrast to men of Cluster 2, men of Cluster 1 refuse to use a PC during leisure time statistically significantly more often ($p = 0.0160$). Among the men of Cluster 2, statistically significantly more ($\chi^2 = 6.390$; $df = 1$; $p = 0.0115$) have a lunch break of about 30 minutes while most men in Cluster 1 have a lunch break of

either 1 hour or none at all.

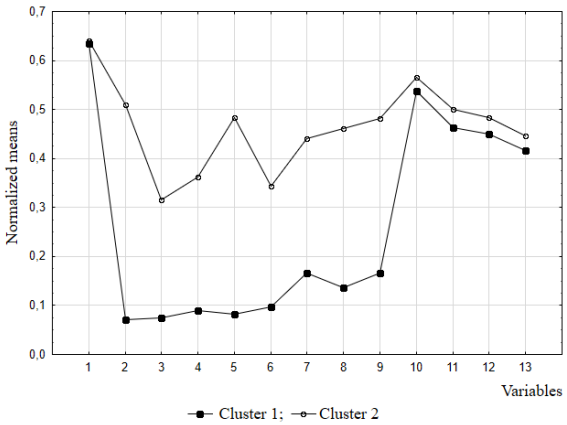
As for the priority types of health-recreational physical activity (HRPA), visiting the swimming pool (p = 0.0131) and playing football, volleyball, basketball (χ^2 = 4.024; df = 1; p = 0.0449) is a statistically significantly less popular type of ARRA among the men of Cluster 1 compared to the men of Cluster 2, but visiting the gym is more attractive among them (χ^2 = 4.473; df = 1; p = 0.0344). At the same time, of those who visit the hall, the participants assigned to Cluster 1 do it 1 – 2 times a week, while the participants of Cluster 2 do so sometimes (χ^2 = 5.617; df = 1; p = 0.0178).

It was found that participants in Cluster 1 more frequently take active breaks while working on computers compared to those in other clusters (χ^2 = 4.272; df = 1; p = 0.0388) and systematically engage in HRPA (χ^2 = 6.753; df = 1; p = 0.0094).

Having determined the indicators by which representatives of different clusters differ, we focused on the study of these differences between men who use computers for work. When evaluating the average duration of computer use, it was found that representatives of Cluster 1 spend statistically significantly less time working on computers per day (U = 323.0; Z = 3.437; p = 0.0006) compared to men in Cluster 2 5.5 (5.5; 7.5) versus 7.5 (5.5; 7.5) hours per day).

In the course of the study, we analyzed the quantitative indicators of men who use computers for work. As can be seen in the graph, depending on the cluster to which they fell, they differ in the intensity of musculoskeletal pain (Graph 1).

Further analysis showed that among men who use computers for work, only 53.5 % do not complain of pain in the joints and 33.8 % do not feel discomfort in the spine after prolonged work at the PC.



Graph 1 Averages for quantitative indicators of men who use computers for work (n = 71). ***Legend:*** 1 – age of the respondent; joints: 2 – current level of pain; 3 – typical level of pain; 4 – pain level in the best period; 5 – level of pain in the worst period; spine: 6 – current level of pain; 7 – typical level of pain; 8 – pain level in the best period; 9 – the level of pain in the worst period; 10 – position of the upper limbs; 11 – position of the lower limbs; 12 – body position; 13 - work experience, years.

At the same time, the study showed that, depending on the cluster, men differ statistically significantly (p < 0.05) in pain sensations both in the joints and in the spine, where representatives of Cluster 2 are characterized by increased pain (Table 2).

Regarding the biogeometric profile of the PC user's working posture in men assigned to different clusters, no statistically significant differences were found (577 < U < 593; 0.318 < Z < 0.482; 0.630 < p < 0.750). It was established that the maximum share of men with a low level of the indicator was found by the position of the trunk: it was 21.1 % by the position of the trunk against 11.3 % by the position

Table 2 Assessment of differences between musculoskeletal pain in men who use computers for work assigned to different clusters (n = 71)

Pain concentration	Indicators of pain level, score	Average, point		Calculated data		
		K1	K2	U	Z	p-level
Joints	Current pain level	0 (0; 4)	3 (1; 4)	171,5	5,194	0,0001
	Typical pain level	0 (0; 1)	3 (2; 4)	195,5	4,916	0,0001
	Level of pain in the best period	0 (0; 1)	1 (2; 3)	279,5	3,942	0,0001
	Level of pain in the worst period	0 (0; 1)	5 (2; 8)	165,5	5,263	0,0001
Departments of the spine	Current pain level	0 (0; 1)	3 (1; 4)	206,0	4,794	0,0001
	Typical pain level	0 (0; 2)	3 (2; 3)	205,5	4,800	0,0001
	Level of pain in the best period	0 (0; 1)	2 (1; 3)	265,0	4,110	0,0001
	Level of pain in the worst period	1 (0; 2)	5 (2; 7)	215,5	4,684	0,0001

Legend: K1, K2 – clusters; U – Mann-Whitney test; Z – a statistic calculated if the volume of at least one sample exceeds 20; p-level – the achieved level of significance

of the upper and 18.3 % by the position of the lower limbs. The largest share of men with a high level of the indicator at 21.1 % was recorded for the position of the upper limbs against 14.1 % for the position of the head and the position of the lower limbs, respectively. We can say that men who use computers for work are generally characterized by an average level of the state of the biogeometric profile of the working posture of the PC user ($\chi^2 = 17.85$; df = 1; $p < 0.05$).

Based on the obtained data, we systematized information on peculiarities of the work organization of men aged 36 – 45 who use computers for work, their lifestyle and display of health disorders. The obtained results are presented in figure 1.

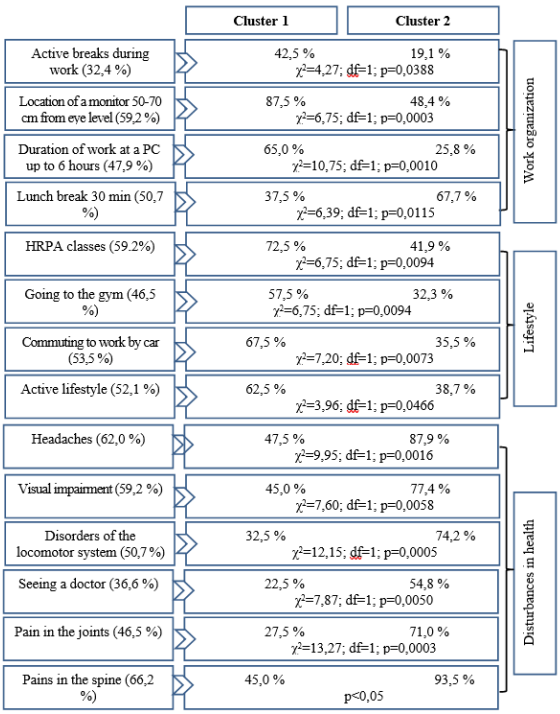


Figure 1 Established differences between men who use computers for work assigned to different clusters (n = 71)

As can be seen from figure 1, Cluster 1 includes men who in comparison to representatives of Cluster 2, take care of their health to a greater extent, taking active breaks while working at the PC, visiting the gym, engaging in HRPA and more often refusing to use the PC during leisure time.

At the same time, representatives of Cluster 1 pay more attention to organization of the working environment, in particular, working up to 6 hours a day and placing the monitor at a distance of 50 – 70 cm at eye level.

Thus, the increased pain sensations in the spine and joints in men of Cluster 2 can be explained by their insufficiently responsible attitude to their own health, insufficient awareness of the benefits of HRPA, and neglect of the rules of behavior when working at PC.

DISCUSSION

Nowadays, an increasingly large share of the working population works in an office environment. The work activity of office employees not only provokes a sedentary lifestyle but is also accompanied by a long stay in a forced static position of the PC user and the performance of monotonous motor actions when working with a mouse (Lazko et. al., 2021a). It is known that using computers for a long time can cause discomfort in the spine, upper limbs, lower limbs, headache, visual fatigue, etc.

If the work is performed in one position, without control of the working posture of the PC user and without active breaks, the risk of a person developing a disease of the musculoskeletal system increases (Lazko et. al., 2021b; Byshevets et. al., 2022; Demissie et. al., 2024). Therefore, studies aimed at assessing the impact of the workplace environment and lifestyle on the health of office employees are becoming more and more relevant.

According to scientific literature, the prevalence of work-related musculoskeletal disorders among computer users ranges from 33.8 to 95.3 % (Demissie et. al., 2024). Note that the testimony of scientists differs depending on the country where the research was conducted. So, Chinese and Thai office employees have more common musculoskeletal disorders related to the cervical spine. Data from studies conducted in Turkey, Brazil, Iran and Kuwait showed that 51 % of office employees had disorders in the lumbar spine (Okezue et. al., 2020). There is evidence that the share of cases of localization of pain in the lumbar spine is 58.1 – 63.1 % (Okezue et. al., 2020). According to our data, the prevalence of complaints in men about musculoskeletal system disorders was 66.2 %, and the share of complaints about discomfort in the lumbar spine reached 40.8 %. Regarding vision, according to our data, 40.8 % of men are characterized by one or another impairment. These results turned out to be somewhat smaller than the data of Gosain et. al. (2022), according to which 66.1 % of office employees complain of eye strain. Such differences can

be explained by the difference in research methodology: our question specified the presence of a disorder (need for glasses, dry eyes), whereas L. Gosain used more general questions about discomfort in the eyes which could lead to more positive answers.

Among the proven evidence of the cause-effect relationship of the development of work-related diseases of the musculoskeletal system, the authors mention the repetition of the same type of movements and uncomfortable postures that are characteristic of office employees, the lack of systematic recreational motor activity classes (Bruno et. al., 2010; Demissie et. al., 2024). Our study showed that the health problems of men who use computers for work are primarily caused by peculiarities of the work organization and lifestyle. In general, men who use computers for work are divided into two clusters. Cluster 1 can tentatively be called "Men with a reduced risk of health problems when working at a PC", and Cluster 2 – "Men with an increased risk of health problems when working at a PC". It turned out that, as in office employees (Lazko et. al., 2022; Byshevets et. al., 2022), musculoskeletal system disorders and pain in the spine and joints in men who use computers for work depend on whether they take active breaks during their professional activities and how actively they engage in HRPA. New information that we received in the course of the study was the confirmation that visual impairment and/or dry eyes are caused by incorrect positioning of the monitor relative to the PC user's eyes. In addition, it was possible to prove that headaches after working at the PC disturb primarily men who do not pay due attention to their own health and do not follow an optimal movement regime.

At the same time, it was proven that only 19.7 % of respondents control the working posture of the PC user, 32.4 % take active breaks during professional activities, and 16.9% perform self-massage. In total, 57.7 % of respondents indicated that their elbows rest on the table when working at a PC, and 59.2% have their lower limbs bent under the table. And, regardless of the cluster, most men do not follow the ergonomically optimal working posture of a PC user. Therefore, it can be argued that even men who were assigned to Cluster 1, in the absence of favorable changes in the work organization, aimed at leveling the consequences of a long stay in a static position of a PC user, will also be at risk of health disorders.

CONCLUSIONS

In general, men who use computers for work are characterized by an average level of the condition of the biogeometric profile of the working posture of a PC user. Among them, there are those in which, when working at the PC, their elbows rest on the table (57.7 %), their legs are bent under the table (59.2 %). At the same time, only 19.7 % of respondents control the working posture of the PC user, 32.4 % take active breaks during professional activities, and 16.9 % perform self-massage. As a result, 66.2 % of respondents report musculoskeletal pain in the spine, 46.5 % – in the joints, 62 % suffer from systematic or periodic headaches, 59.2 % – visual impairment, 50.7 % – diseases of the musculoskeletal system.

During the breakdown of the sample of men who use computers for work, the respondents were divided into 2 clusters. 56.3 % of respondents fell into Cluster 1 which because of the analysis of the obtained results, we tentatively named "Men with a reduced risk of health disorders when working on a PC", the remaining 43.7 % fell into Cluster 2 named "Men with an increased the risk of health problems when working on a PC". Compared to Cluster 2, representatives of Cluster 1 take care of their health to a greater extent: they take active breaks while working at the PC, visit the gym, engage in health-recreational physical activity (HRPA), and more often refuse to use the PC during their leisure time. In addition, they pay more attention to the work organization: the duration of their working day is up to 6 hours, they place the monitor at a distance of 50 – 70 cm at eye level, and take active breaks during work. On the other hand, men who formed Cluster 2 complain more about musculoskeletal pain, headaches, visual impairment and musculoskeletal disorders.

The obtained results indicate that the scientific community should concentrate efforts on the development of measures aimed at overcoming the trend of the lack of health-saving measures while working on computers which increases the negative impact of the work environment on men who use computers for work.

Limitations. It should be noted that our study concerned only Ukrainian men aged 36 – 45 (n = 71). This may limit the ability to generalize the obtained data to men of other ages, as well as to men who use computers for work from other countries where working conditions may differ significantly.

The voluntary nature of research participation may lead to sample bias. It is possible that men who agreed to participate in the study are more health-conscious and pay more attention to workplace ergonomics than men who did not agree to the survey.

To obtain definitive conclusions, there is a need to continue the study with a larger and more representative sample of men, as well as taking into account other influencing factors such as noise level, lighting and ergonomic characteristics of the workplace. However, the data presented in our article may be of interest to physical education and sports specialists who are interested in identifying risk factors for diseases of the musculoskeletal system in men related to work. At the same time, prospects for early interventions are opening up.

REFERENCES

ALOSHINA A., VYPASNYAK I., KASHUBA V. Correction of a person's physique in the process of physical exercises: theoretical and practical aspects: col. monogr. 2022c. Lutsk: Vezha-Druk.

ALOSHYNA A., ROMANIUK V., PETROVYCH V. Environmental factors affecting the state of the spatial organization of the body of a modern person. *Physical education, sports and health culture in modern society*. 2022b. 4 (60): 33-41.

ALOSHYNA A., ROMANIUK V., PETROVYCH V. The state of the biomechanics of the locomotor apparatus of mature men as a prerequisite for programming corrective and preventive and physical culture and wellness classes. *Physical culture, sport and health of the nation*. 2022a. 14 (33): 29-38.

DA COSTA B.R., VIEIRA E.R. Risk factors for work-related musculoskeletal disorders: a systematic review of recent longitudinal studies. *American Journal of Industrial Medicine*. 2010. 53 (3): 285-323.

BYSHEVETS N., SHYNKARUK O., STEPANENKO O. et al. Development skills implementation of analysis of variance at sport-pedagogical and biomedical researches. *Journal of Physical Education and Sport*. 2019. 19: 2086-90.

BYSHEVETS N. Express estimation of the user's working posture in learning process. *Journal of Education, Health and Sport*. 2017. 7 (8): 1628-41.

BYSHEVETS N., IAKOVENKO O., STEPANENKO O. et al. Formation of the knowledge and skills to apply non-parametric methods of data analysis in future specialists of physical education and sports. *Sport Mont*. 2021. 19 (S.i.2): 171-175.

BYSHEVETS N., KASHUBA V., LEVANDOVSKA L. et al. Risk factors for posture disorders of esportsmen and master degree students of physical education and sports in the specialty «Esports». *Sport i Turystyka*. 2022. 5 (4): 97-118.

DALMAIJER E.S., NORD C.L., ASTLE D.E. Statistical power for cluster analysis. *BMC Bioinformatics.* 2022. 23: 205.

DEMISSIE B., BAYIH E.T., DEMMELASH A.A. A systematic review of work-related musculoskeletal disorders and risk factors among computer users. *Heliyon*. 2024. 10 (3): e25075.

DIACHENKO-BOHUN M., HRYTSAI N., GRYNOVA M. et al. Historical Retrospective of the Development of Scientific Approaches to Health-Saving Activity in Society. *International Journal of Applied Exercise Physiology*. 2020. 9 (1): 31-38.

GOSAIN L., AHMAD I., RIZVI M.R. et al. Prevalence of musculoskeletal pain among computer users working from home during the COVID-19 pandemic: a cross-sectional survey. *Bull Fac Phys Ther*. 2022. 27 (1): 51.

HAKMAN A., ANDRIEIEVA O., KASHUBA V. et al. Characteristics of Biogeometric Profile of Posture and Quality of Life of Students During the Process of Physical Education. *Journal of Physical Education and Sport*. 2020. 20 (1): 79-85.

KASHUBA V., GRYGUS I., RUDENKO Y. The state of the spatial organization of the body of persons of mature age: the challenge of today. Influence of physical culture and sports on the formation of an individual healthy lifestyle: Scientific monograph. Riga, Latvia: Baltija Publishing. 2023. 56-78.

KASHUBA V., HONCHAROVA N., NOSOVA N. Biomechanics of the spatial organization of the human body: theoretical and practical aspects. *Theory and methods of physical education and sports*. 2020a. 2: 67-85.

KASHUBA V., RUDENKO Y., KHABYNETS T. et al. Use of correctional technologies in the process of health-recreational fitness training by

men with impaired biogeometric profile of posture. *Pedagogy and Psychology of Sport*. 2020b. 6 (4): 45-55.

KETT A., SICHTING F., MILANI T. The Effect of Sitting Posture and Postural Activity on Low Back Muscle Stiffness. *Biomechanics*. 2021. 1 (2): 214-24.

KRIPA S., KAUR H. Identifying relations between posture and pain in lower back pain patients: a narrative review. *Bull Fac Phys Ther*. 2021. 26: 34.

LABINSKA H., KASHUBA V., LABINSKYI P. Effect of physical therapy on vertebral artery functional compression syndrome. *Journal of Physical Education and Sport*. 2021. 21 (5): 2820-2826.

LAZKO O, BYSHEVETS N., PLYESHAKOVA O. et al. Determinants of office syndrome among women of working age. *Journal of Physical Education and Sport*. 2021b. 21 (Suppl. issue 5): 2827-2834.

LAZKO O., BONDAR O., LUTSKYI V. et al. The structure and content of the technology for correcting disorders of the musculoskeletal system of women aged 36-45 by means of fitness. *Physical culture, sport and health of the nation*. 2022. 13 (32): 324-35.

LAZKO O., BYSHEVETS N., KASHUBA V. et al. Prerequisites for the Development of Preventive Measures Against Office Syndrome Among Women of Working Age. *Teorìâ ta Metodika Fìzičnogo Vihovannâ*. 2021a. 21 (3): 227-234.

OKEZUE O.C., ANAMEZIE T.H., NENE J.J. et al. Work-Related Musculoskeletal Disorders among Office employees in Higher Education Institutions: A Cross-Sectional Study. *Ethiop J Health Sci*. 2020. 30 (5): 715-724.

RUDENKO Y. Correction of violations of the state of the biogeometric profile of the posture of mature men in the course of health fitness classes [dissertation]. 2021. Kyiv: NUFVSU.

TOMILINA Y., BYSHEVETS N. The condition of the spine of women in the first period of adulthood during Pilates classes. *Youth Scientific Bulletin*. 2018. 29: 70-75.

WAONGENNGARM P., VAN DER BEEK A., AKKARAKITTICHOKE N. et al. Perceived musculoskeletal discomfort and its association with postural shifts during 4-h prolonged sitting in office employees. *Appl. Ergon*. 2020. 89: 103225.